Plastics Waste Processor

The U.S. Navy's Plastics Waste Processor converts shipboard-generated plastic waste into a dense, sanitary disk suitable for long term storage. This waste stream includes lightly food-contaminated as well as clean plastic. The Plastics Waste Processor is designed to handle other materials that may be combined with, or contain, plastic components that cannot be processed in the normal solid waste stream.

The Plastics Waste Processor allows the U.S. Navy to comply with MARPOL ANNEX V and U.S. legislation which implement a total ban on discharging plastic anywhere at sea after 31 December 1998.

The concept and design of the United States Navy Plastics Waste Processor have been successfully proven through in-depth laboratory and extensive at-sea testing aboard various Navy ships. In 1995, production contracts were awarded to two United States companies who produced enough Plastics Waste Processors to outfit all active U.S. Navy ships, frigate size and larger. Plastics Waste Processor installations aboard U.S. Navy ships will be completed by the end of December 1998.

The Plastics Waste Processor (PWP) system consists of four components designed to shred, process and compact shipboard plastic waste into a 20-inch (51-cm.) diameter compressed disk. These components are a Plastics Shredder, Compress Melt Unit (CMU), Closed Loop Cooling Unit (CLCU) and a Heat Sealer. A PWP System for a ship with a crew size of 300 will consist of two CMUs, one Plastics Shredder, one CLCU and a Heat Sealer.

PWP equipment is not complicated to operate or maintain. One sailor can easily operate an entire system.

The PWP system is designed to not only meet rugged shipboard operating conditions, but is also a highly cost effective solution to processing plastic waste aboard any class ship, frigate size or larger.

EQUIPMENT CHARACTERISTICS

Performance:

Plastics Waste Processor

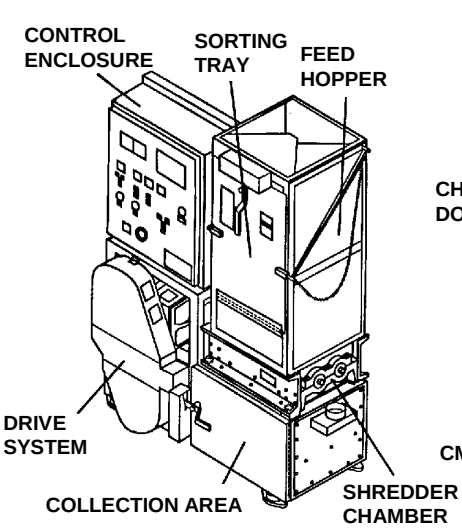
Processing Rate:	20 pounds (9.1 kg)/hr per two CMUs
Volume Reduction:	30 to 1

Envelope:

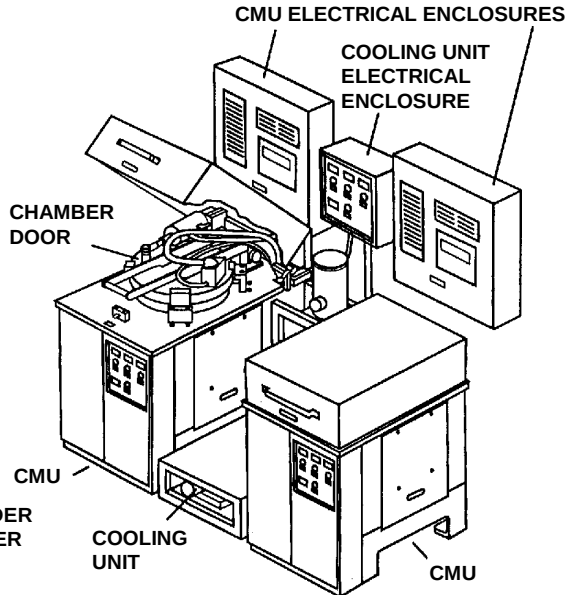
Footprint:	Each Plastics Shredder: 52 inches (132 cm) wide by 25 inches (64 cm) deep by 77 inches (196 cm) high Each CMU: 25.5 inches (65 cm) wide by 54 inches (137 cm) deep by 78 inches (2 m) high (includes rear enclosure) Each CLCU: 19 inches (48 cm) wide by 38 inches (97 cm) deep by 78 inches (2 m) high (includes rear enclosure) Each Heat Sealer: 14 inches (36 cm) wide by 7 inches (18 cm) deep by 7 inches (18 cm) high
Weight:	Each Plastics Shredder: 1800 pounds (818 kg) Each CMU: 1250 pounds (567 kg) Each CMU rear electrical enclosure: 160 pounds (73 kg) Each CLCU: 375 pounds (170 kg) Each CLCU rear electrical enclosure: 40 pounds (18 kg) Each Heat Sealer: 15 pounds (7 kg)

Services:

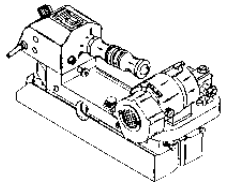
Compressed Air Supply:	1.5 standard cubic feet per minute (0.71 L/s) (intermittent) for CMU/CU set. 80 pounds per square inch (551 kPa) to 125 pounds per square inch (861 kPa) gage per CMU (includes CLCU).
Cooling Water Supply:	30 gallons per minute (1.9 L/s) seawater per CLCU
Ventilation Supply:	100 standard cubic feet per minute at 0.25 inches H_2O (47.19 L/s at 0.062 kPa) per CMU and Plastics Shredder
Control Enclosures:	Bulkhead mounted
Electrical Power Supply:	Each Plastics Shredder: 440 Volts alternating current, 3-phase, 25 Amps, 60 Hertz Each CMU: 440 Volts alternating current, 3–phase, 50 Amps, 60 Hertz Each CLCU: 440 Volts alternating current, 3–phase, 15 Amps, 60 Hertz Each Heat Sealer: 120 Volts alternating current, 3 Amps, 60 Hertz



PLASTICS SHREDDER



COMPRESS MELT UNITS AND CLOSED LOOP COOLING UNIT



HEAT SEALER

Processing Plastic Waste Becomes an Easy Three-Step Operation:

- First Step: Plastic waste is batch-loaded into a Plastics Shredder. The Shredder breaks apart rigid containers and provides a "homogeneous" mixture for the Compress Melt Unit (CMU). The shredded plastic drops into a removable plastic bin lined with a plastic bag located in the shredder collection area.

- Second Step: The bag of shredded plastic is removed from the shredder and loaded into the vertical tubular Compress Melt Unit chamber. Additional bags of plastic can be added until the chamber is full. The operator closes the chamber door and safety cover and presses the start button to begin processing the plastic into a disk.

  - A vertically mounted ram in the CMU compresses the plastic upward against the chamber door. The ram, door, and chamber are heated to the process temperature. Heat and pressure form the disk.

  - The CMU is cooled so the melted plastic disk can be stabilized. An integrated Closed Loop Cooling Unit (CLCU) removes the heat from the CMU via a seawater heat exchanger.

  - The CMU door unlocks when the processing cycle is complete. The operator opens the safety cover and door and removes the stabilized disk.

- Third Step: Food-contaminated disks are heat-sealed in odor barrier bags and retained in designated shipboard storage locations until the ship returns to port.

Completed plastic disks result in a plastic volume reduction of 30 to 1.

Each CMU can process a 10-pound disk every 45 minutes.

Manning, Training, and Safety Requirements:

STEP 1: Shred Plastic Waste in Plastics Shredder

STEP 2: Process Shredded Plastic Waste in CMU to Form Disk

STEP 3: Seal Food-Contaminated Plastic Disks in Odor Barrier Bags using a Heat Sealer

- Manpower requirements for operation can be met by the ship's complement of food mess or storekeeper type personnel.
- The PWP is considered as typical shipboard hull, machinery and electrical type equipment for maintenance purposes.
- A computer-based training curriculum has been developed to effectively train operator and maintenance personnel.
- PWP equipment is outfitted with a number of safety devices and interlocks designed to prevent injury to the operator.
- PWP operators are required to wear safety gloves, an apron, eye protection, and hearing protection.

Equipment Compatibility/Operability

- No sea state or climatic condition limitations.
- Operates at sea or in port.
- Designed and tested for shock, vibration, electromagnetic interference, airborne/structureborne noise, and magnetic compatibility.

Logistics and Maintenance Support:

- Technical Manuals to operate, maintain, troubleshoot and repair each type of equipment are provided.
- Detailed step-by-step scheduled preventive maintenance procedures are provided.
- Repair parts readily available.
- Minimal special tools and consumable items are required.

PWP SYSTEM KEY FEATURES:

- All components of the PWP are fully modular.
- The PWP processes food-contaminated as well as clean plastic waste.
- Completed plastic disks result in a plastic volume reduction of 30 to 1.
- Each CMU can process a 10 pound disk every 45 minutes.
- One sailor can easily operate a PWP system.
- A computer-operated message display directs the operator through equipment operation and helps troubleshoot problems.
- One sailor can easily process the plastic waste generated by 1,000 sailors.

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

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